

PATENT COOPERATION TREATY

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REC'D 22 SEP 2000

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 92228/PRS	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/01918	International filing date (day/month/year) 16/06/1999	Priority date (day/month/year) 19/06/1998
International Patent Classification (IPC) or national classification and IPC G09F9/35		
Applicant CAMBRIDGE DISPLAY TECHNOLOGY LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 10 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 14/01/2000	Date of completion of this report 20.09.00
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Pulver, M Telephone No. +49 89 2399 2445 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/01918

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1,2,5-14	as originally filed			
3,4	as received on	08/07/2000	with letter of	06/07/2000

Claims, No.:

1-27	as received on	08/07/2000	with letter of	06/07/2000
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Drawings, sheets:

1/2,2/2	as originally filed
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2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 26,27.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. see Item VIII are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-23,25
	No:	Claims	24
Inventive step (IS)	Yes:	Claims	15,16
	No:	Claims	1-14,17-23,25
Industrial applicability (IA)	Yes:	Claims	1-25
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01918

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Item V:

The following objections are raised in view of the documents WO 96/33483 and WO 98/24271. WO 98/24271 is a PCT application filed in Japanese with the international publication date of 04.06.1998 and, therefore, constitutes prior art according to Rule 64.1 PCT. In order to simplify reference to the relevant paragraphs of this text use will be made of the EP-A-0 880 303 which corresponds to WO 98/24271. The content of the description of EP-A-0 880 303 is regarded as an english translation of the description of WO 98/24271.

- 1.) From WO 96/33483 a display device is known which comprises a light modulator and a multicolor light emitting device (page 4, lines 29-37). Said light modulator is a liquid crystal display device and corresponds to a light switching unit as defined in claim 1 of the present application.

Said light emitting device acts as a backlight for the display and comprises a plurality of light emitting (linear) regions of different color arranged adjacent one another (page 6, lines 14-20 and fig. 8). Said light emitting regions are "strip-like" (page 9, line 10) or in other words extend "row-wise" (page 9, line 31), which is both understood as a linear region. Each of said regions is located so as to lie behind a plurality of pixels of the array of the light switching unit in the viewing direction for backlighting those pixels (page 5, lines 1-10 and page 12, line 35 to page 13, line 3). The regions of organic light-emissive material are formed from organic electroluminescent materials which are deposited by printing techniques (page 13, lines 6-8).

It is noted that a backlight as defined in claim 1 of the present application comprises only two series of regions of organic light-emissive material with different emission colors. However, it is clear that the choice of the number of regions having a different emission color is a normal design procedure within a limited range of possibilities.

A display device according to claim 1 of the present application differs from that disclosed in WO 96/33483 in that the (linear) regions of organic light-emissive material are formed by a process of ink-jet deposition.

It is noted that a printing technique applied to deposit the organic light emitting material must be capable of forming the linear regions with high precision and sufficient speed and must be compatible with the material to be deposited. Only few printing techniques appear to exist which meet these requirements.

From WO 98/24271 (cf. EP-A-0 880 303 on page 4, lines 35-45 and page 14, lines 29-31) it is known that ink-jet deposition of organic luminescent materials for forming electroluminescent elements is a fast process which allows fine and precise patterning (page 4, lines 44-45). Further a suitable ink can be prepared easily from the (sensitive) materials (page 4, line 42).

In this context it is noted that the formation of linear regions of organic light-emissive material instead of pixel regions (which are disclosed in WO 98/24271) is an obvious selection among a limited number of known possibilities, since light emitting devices known in the art comprise the light emitting regions either in the form of pixels or rows, i.e. lines (= linear regions) (cf. WO-A-96/33483).

Thus, forming the light-emitting linear regions by ink-jet deposition appears obvious and the invention consists merely in choosing from a limited number of known possibilities (i.e. suitable printing techniques).

A display device according to claim 1 of the present application is therefore obvious.

- 2.) The dependent claims 3, 4, 7, 8, 17 to 19 and 23 concern particular embodiments of the display device of the invention, which are obvious, since they are disclosed in WO 96/33483.

The dependent claims 2 to 14 and 20 to 22 concern particular embodiments of the backlight (=light emitting device) of the display device of the invention, which are also obvious, since they are disclosed in WO 98/24271 (see EP-A-0 880 303).

A display device according to any one of the claims 2 to 14 and 17 to 23 of the present application is therefore obvious.

- 3.) From WO 98/24271 a method is known, said method comprising the steps of forming banks (=walls) which define a series of grooves on a substrate (cf. EP-A-0 880 303 on page 4, line 26) and depositing by means of ink-jetting in different grooves different organic light-emissive materials having different emission colors, thereby forming the light-emissive unit of a display device (cf. EP-A-0 880 303 on page 9, lines 20-22).

A method according to claim 25 of the present application differs from the prior art in that the regions of organic light-emissive material are linear.

It is noted that light emitting devices known in the art may comprise the light emitting regions either in the form of pixels (cf. EP-A-0 880 303) or rows, i.e. lines

(= linear regions) (cf. WO-A-96/33483).

It is further noted that the ink-jet deposition process is well known for the possibility to precisely position ink on a substrate according to any geometry needed and to print even large scale images with sufficient speed. Thus, ink-jet deposition is obviously suitable to form linear regions of luminescent material as well as pixels regions.

The formation of linear regions of organic light-emissive material instead of pixel regions by state-of-the-art ink-jet printing techniques appears therefore to be an obvious alternative selection among a limited number of known possibilities.

Further a method according to claim 25 of the present application differs from the prior art in that the grooves filled with the organic light-emissive material are finally located behind a respective plurality of pixels of the array of a light switching unit in the viewing direction for backlighting those pixels. Thus, the light-emissive unit and the light switching unit are joined together to form a display device.

In the first place, it is noted that the use of organic light-emissive materials (in the form of the corresponding light-emitting elements) as backlight for liquid crystal displays which act as light switching units is known in the art (cf. description of the present application on page 1, lines 29-31).

With regard to the known display devices comprising a light switching unit and a backlight unit comprising an electroluminescent light emitting device (cf. e.g. WO-A-96/33483 on page 5, lines 1-10 which has been cited in the present application on page 3, lines 12-16) it is clear that the light emitting regions have to be located so as to lie behind the pixels of the light switching unit as defined in claim 25. This is of course true for both the light emitting regions comprising pixels and those comprising linear regions.

Thus, the process of joining a light-emissive unit which has been formed as mentioned above to a light switching unit is known and the invention consists merely in an obvious combination of features. A non-obvious working inter-relationship which would establish an inventive step is not produced.

A method according to claim 25 of the present application is therefore obvious.

- 4.) A display device as disclosed in WO 96/33483 comprises a light switching unit (=light modulator) and a backlight (=light emitting device) as defined in claim 24 of the present application (page 4, line 29 to page 5, line 10). The regions of organic

light-emissive material are formed by printing techniques (page 13, lines 6-8) in the form of "rows" (cf. fig. 8 and page 9, lines 30-32) or "strip-like" regions (page 9, line 10), which are understood as linear regions.

It is noted that the present application mentions mainly printing techniques as suitable selective deposition processes (page 12, lines 4-9).

A display device according to claim 24 of the present application is therefore known from WO 96/33483.

- 5.) The closest prior art relating to a display device is WO-A-96/33483 (cf. Item V, 1.). A display device as defined in the claims 15 and 16, respectively, differs from the prior art in that it comprises a structure for receiving and narrowing the light emission from at least one of the regions of light emissive material as defined in said claims.
- A display device according to the claims 15 and 16 of the present application is therefore new.

The problem to be solved is to provide a display device wherein backlighting is provided by means of organic light emissive material which comprises a structure capable of influencing the emission color of said organic light emissive material. Thus the emission color may be purified and the emission spectrum may be sharpened.

A display device according to the claims 15 and 16 of the present application in order to solve said problem is not suggested in the prior art and involves therefore an inventive step.

Item VII and VIII:

- 1.) According to the claims 1 and 25 the organic light-emissive material is deposited by an ink-jet process. It is understood that said organic light-emissive material must be ink-jetable.
- However, according to the description the organic light-emissive material is most **preferably ink-jetable** (page 6, lines 13-14). It is understood that this feature is optional and the organic light-emissive material may be different from that defined in the claims. (A material which is not ink-jetable can obviously not be deposited by an ink-jet process.)

The resulting inconsistency regarding an apparently essential feature of the invention between the claims 1 and 25 and the description renders the intended scope of protection of said claims unclear (Art. 6 PCT).

- 2.) According to claim 25 the method comprises the step of ink-jetting the organic light-emissive material into the grooves on the substrate.

However, according to the description ink-jetting **into the grooves is only preferred** (page 4, lines 29-31). It is understood that the organic light-emissive material is not necessarily deposited into a groove and the method may be different from that defined in the claim.

The resulting inconsistency regarding an apparently essential feature of the invention between claim 25 and the description renders the intended scope of protection of said claim unclear (Art. 6 PCT).

- 3.) The display device and the method according to the claims 26 and 27, respectively, are defined by reference to the description and the accompanying drawings.

However, it is not clear which particular features of the description and the drawings are to be put under protection. Thus, the technical features that define the display device and the method, respectively, are not contained in the claims. In view of Article 6 PCT and Rule 6.2 a) PCT, the claims 26 and 27 are not allowable.

- 4.) According to claim 7 electrodes are located on either side of the light-emissive material and according to claim 8 at least one of said electrodes is light transmissive.

However, in view of the description of the present application (page 1, lines 20-27) and the prior art (e.g. WO 96/33483) electrodes located on either side of the light-emissive material appear to be essential to electroluminescent elements.

Moreover, it appears that at least one of said electrodes must be light transmissive in order to allow the light to pass through the electrode towards the viewer.

Therefore, it appears that the features mentioned in claims 7 and 8 are essential features of the backlight of the display device of the present invention.

- 5.) In the description reference to other patent documents has been incorporated as part of the disclosure of the invention (page 1, lines 7-8).
However, if matter in the documents referred to is necessary for a full understanding of the invention of the present application, it is required to incorporate essential details of said documents into the description. The patent specification should, regarding the essential features of the invention, be self-contained, i.e. capable of being understood without reference to any other document. If said patent documents are in fact not essential for carrying out the invention, the used expression "which is herein incorporated by reference" should be deleted from the description.
- 6.) According to the claims 1, 24 and 25 the regions of organic light-emissive material are linear regions.
It is noted that according to the description the regions of organic light-emissive material are only preferably linear but may have other forms as well (page 4, lines 21-23).
The resulting inconsistency renders the claims 1, 24 and 25 unclear (Art. 6 PCT).
- 7.) It is noted that patent application numbers have been cited in the description (page 1, lines 7 and 14 and page 3, line 11) instead of the corresponding patent publication numbers.

PCT INTERNATIONAL COOPERATION TREATY

09/719955

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From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

SLINGSBY, Philip, Roy
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNI

Date of mailing (day/month/year) 30 January 2001 (30.01.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 92228/PRS	
International application No. PCT/GB99/01918	International filing date (day/month/year) 16 June 1999 (16.06.99)

1. The following indications appeared on record concerning:		
<input checked="" type="checkbox"/> the applicant	<input type="checkbox"/> the inventor	<input type="checkbox"/> the agent <input type="checkbox"/> the common representative
Name and Address CAMBRIDGE DISPLAY TECHNOLOGY LTD. 181a Huntingdon Road Cambridge CB3 0DJ United Kingdom	State of Nationality GB	State of Residence GB
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:		
<input type="checkbox"/> the person	<input type="checkbox"/> the name	<input checked="" type="checkbox"/> the address <input type="checkbox"/> the nationality <input type="checkbox"/> the residence
Name and Address CAMBRIDGE DISPLAY TECHNOLOGY LTD. Greenwich House Madingley Rise Madingley Road Cambridge CB3 0HJ United Kingdom	State of Nationality GB	State of Residence GB
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
3. Further observations, if necessary:		
4. A copy of this notification has been sent to:		
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned	
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned	
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:	

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Maria Victoria CORTIELLO Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 03 March 2000 (03.03.00)	Applicant's or agent's file reference 92228/PRS
International application No. PCT/GB99/01918	Priority date (day/month/year) 19 June 1998 (19.06.98)
International filing date (day/month/year) 16 June 1999 (16.06.99)	
Applicant HEEKS, Stephen, Karl et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

14 January 2000 (14.01.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer Olivia RANAIVOJAONA</p> <p>Telephone No.: (41-22) 338.83.38</p>
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